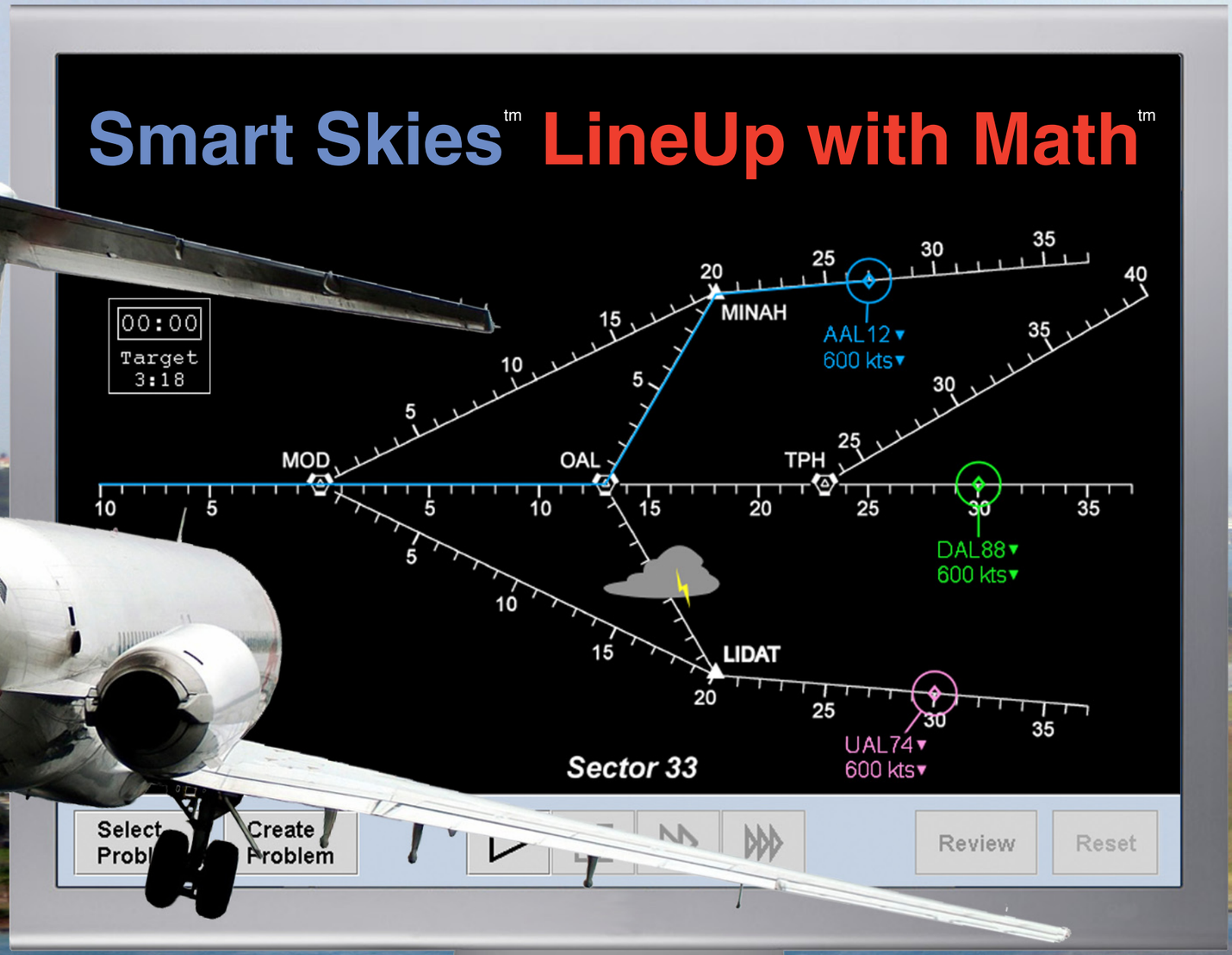
National Aeronautics and Space Administration

Smart Skies™ LineUp with Math™



Be An Air Traffic Controller!

Students visit:
www.atcsim.nasa.gov

Distance-Rate-Time Problems in Air Traffic Control

Grades 5-9

Standards-Based:
- Proportional Reasoning
- Distance = Rate • Time
- Decision Making

FREE Online

Free Teacher Materials at:
www.smartskies.nasa.gov

www.nasa.gov

Smart Skies™ LineUp with Math™

By NASA

Interactive and Hands-On Math

Grades 5-9

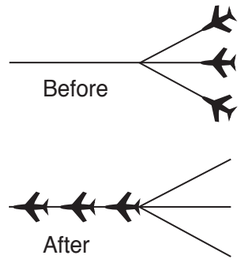
www.smartskies.nasa.gov

NASA Ames Research Center
Education Department
Moffett Field, CA 94035-1000

EW-2007-06-002-ARC

Distance-Rate-Time Investigations in Air Traffic Control

Students use a Web-based air traffic control (ATC) **interactive simulator** to "line up" two or more planes safely, with proper spacing, at a given intersection of jet routes. The challenge is to bring the planes to the intersection in the shortest amount of time. To do this, students apply **proportional reasoning** and **distance-rate-time relationships** to change plane routes and speeds. Printed **workbooks** provide the underlying mathematics and strategies.



Six Problem Sets

LineUp With Math™ consists of six Problem Sets, A-F:

- **A** Learn about the environment of real air traffic control.
- **B & C** Analyze conflicts between 2 or 3 planes and resolve the conflicts by rerouting.
- **D** Learn about the basic effects of differences in speed.
- **E & F** Analyze conflicts between 2 or 3 planes and resolve the conflicts by changing plane speed.

Classroom Implementation

In the classroom, students:

1. Explore a problem on the Simulator.
2. Learn the underlying math using printed workbooks.
3. Return to the Simulator to "line up" the planes safely and on time.

Standards-Based and Classroom-Tested

Line Up with Math™ is aligned to the following NCTM and state math standards for grades 5-9:

- Proportional reasoning
- Distance-rate-time relationships
- Problem solving
- Decision making

The materials have been classroom-tested with thousands of students nationwide.

Real-life Applications

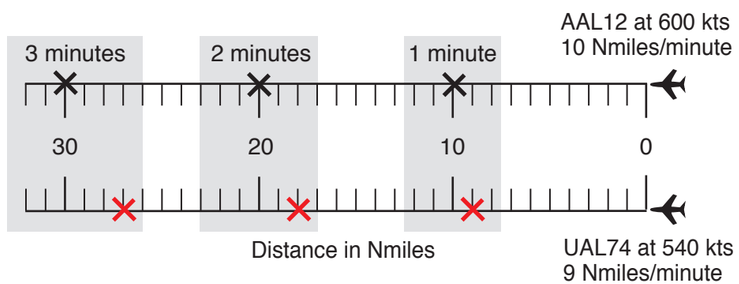
LineUp With Math™ was developed under Smart Skies,™ a key part of the NASA Airspace System Program's educational efforts. Smart Skies™ supports the Program's goal to develop advanced research and technology to enable the nation's air transportation system to operate with reduced flight delays and improved efficiency and access.

Proportional Reasoning: Relating speed changes to distance changes

1 knot = 1 Nautical mile (Nmile) per hour

600 knots = 600 Nmiles per 60 minutes
600 knots = 10 Nmiles per 1 minute

540 knots = 540 Nmiles per 60 minutes
540 knots = 9 Nmiles per 1 minute



A difference of 1 Nmile/minute results in 1 Nmile additional separation each minute.

All Materials FREE Online

The comprehensive collection of instructional materials includes:

- Interactive Online Simulator
- Student Workbooks
- Videos
- Teacher Guides
- Answers and Solutions

Teachers access the materials at:
www.smartskies.nasa.gov

Students access the simulator at:
www.atcsim.nasa.gov

Federal Aviation Administration

The FAA has entered into a partnership with NASA to support education outreach including Smart Skies™.

To find out about events, tours, or classroom visits, contact your Regional FAA Education Manager at:
www.faa.gov/education
(Click on: Aviation & Space Education Contact Us)